

WHAT IS CLAIMED IS:

1. A method of addressing in quantum network which includes at least three nodes,
5 comprising steps of:
appointing each node an address serial number;
sending photon signals with different wavelengths from each node to other nodes, wherein
each of the photon signals regards signal source wavelength and node address as an
addressing badge, said addressing badge is made up of two parts: one part is determined by
10 the wavelength of the photon signal which the node sends, and the other part is determined
by the address serial number of the node; and
determining, by each node, where the photon signals come from by using the addressing
badges of the photon signals.
- 15 2. The method of claim 1, wherein when the number of nodes in the network is odd, the
number of said signal source wavelengths is N ; when the number of nodes is even, the
number of said signal source wavelengths is $N-1$, where N is the number of nodes in the
network.
- 20 3. The method of claim 1, wherein said photon signal is optical quantum state signal, or
classical optical signal.
4. A quantum network router used for the method of claim 1, comprising:
a photon signal allocator including N sets of optical components, here N is the number of
25 nodes in the network, one end of each optical component is mix-wavelength interface, and
the other end includes separate wavelength interfaces;
an external interface comprising mix-wavelength interfaces of optical components;
wherein the number of separate wavelength interfaces is at least $N-1$, every separate
wavelength interface transmits different photon signals with different wavelengths, and
30 separate wavelength interfaces of different optical components, which transmit the same
wavelength signals, connect one to one.
5. The quantum network router of claim 4, wherein when N is even, said separate
wavelength interfaces of each optical component are the same, and the total number of
35 wavelengths used in the whole quantum network router is $N-1$; when N is odd, any two
optical components have one different separate wavelength interface, and the total number
of wavelengths used in the whole quantum network router is N .
6. The quantum network router of claim 4, wherein said optical component is made up of
40 integrated or separate dispersive and accessorial passive optical components.
7. The quantum network router of claim 4, wherein said optical component is reversible
wavelength division multiplexer.
- 45 8. The quantum network router of claim 4, wherein said optical connection is achieved via

fiber, wave-guide, free space or other optical medium.

5 9. The quantum network router of claim 4, wherein said optical connection can add collimating, coupling or reflecting optical passive components in the optical path to improve the optical capability of the connection.

10 10. The quantum network router of claim 4, wherein said optical components of the whole quantum network router, include dispersive, collimating, orienting or coupling components, are integrated with wave-guide substrate totally or partially.